TECHNICAL MANUAL No. 11-5805-201-12
TECHNICAL ORDER No. 31W1-2PT-291

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON, D.C., *22 June 1967*

Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List

TELEPHONE SET TA-312/PT

* This manual supersedes so much of TM 11-2155, 27 December 1957, including C 1, 3 June 1960; C 3, 13 March 1963; and C 4, 18 November 1963, as pertains to operation and organizational maintenance, (TO 31W1-2PT-291, 27 December 1957, including C 1, 3 June 1960).

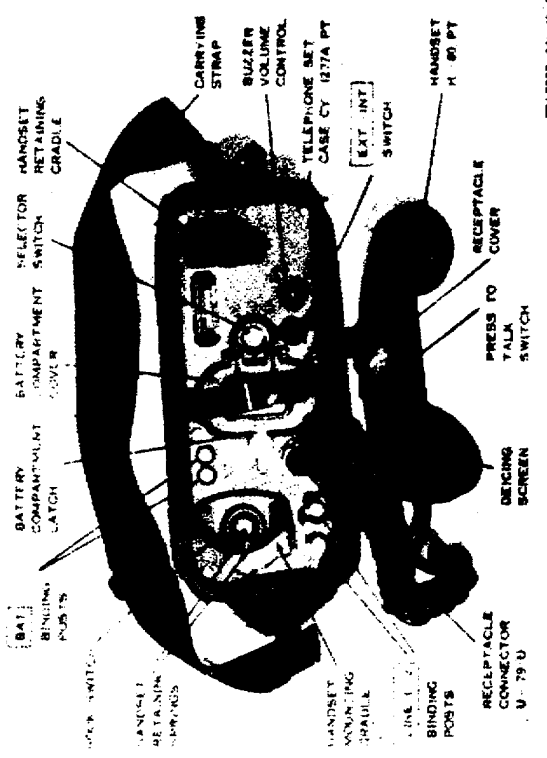


Figure 1-1. Telephone Set TA-312/PT case open, and Handset H-60/PT, removed from cradle.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Telephone Set TA-312/PT and covers its installation, operation, and organizational maintenance. It includes operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of authorized parts for organizational maintenance personnel.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Therefore, Case, Telephone Set CY-1277(*)/PT represents Cases, Telephone Set CY-1277A/PT and CY-1277B/PT. Handset-Headset H-144(*)/U represents Handset-Headsets H-144/U, H-144A/U, H-144B/U, and H-144C/U.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP PUB 378/AFR 71-4/MCO P4030.29, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33/AFM 75-18/MCO P4610.19A, and DSAR 4500.15.

1-3.1. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms), and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-C, Fort Monmouth, N.J. 07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

The TA-312/PT is a two-wire, battery-operated field telephone. It may be used in a simple point-to-point voice frequency (vf) wire communication link or in any two-wire ringdown subscriber position of a telephone communication system.

1-5. Technical Characteristics

a. Voltage requirements ____3 volts dc.

b. Frequency range _____300 to 3,200 cps.

c. Signaling:

Frequency _____20 cps.

Voltage _____90 to 100 volts.

d. *Station-to-station distance.*

*Wire description and type or gage	Maximum distance (miles)	
	Wet	*Dry*
Wire, Cable, Telephone WD-1/TT (field wire).	14	22
	Loaded	*Not loaded*
Wire, Cable, Telephone WD-14/TT (field wire).	22	14
Cable Assembly, Telephone CX-1065/G (spiral-four).	50	29
Cable Assembly, Telephone CX-162/G (five-pair cable).		23
Lead-covered cable, 19-gage _____		30
Lead-covered cable, 22-gage _____		20
Lead-covered cable, 24-gage _____		15
Open-wire lines, W-2 #14 AWG copper.		220
Open-wire lines, W-74 #12 AWG copper.		520

1-6. Items Comprising an Operable Equipment

FSN	*QTY*	*Nomenclature, part No., and mfr code*
		NOTE
		The part number is followed by the applicable five digit Federal supply code for manufacturers or distributor or Government agency, etc, which is identified in SB 708-42.
5805-503-1469	1	Generator, Ringing, Hand G-42A/PT
5965-669-9145	1	Handset H-60/PT

1-7. Description

(figs. 1-1 and 1-2)

All connections and operating controls of the TA-312/PT are located on the panel assembly and housing. The handcrank (part of Generator, Ringing, Hand G-42A/PT) for generating the ringdown signal is located on the side of the housing. Connector, Receptacle U-79/U allows connection of Handset-Headset H-144(*)/U for use in place of the H-60/PT.

1-8. Additional Equipment Required

Two Batteries BA-30 or an external 3-volt direct current (dc) source are required. The external source must be connected to the BAT binding posts.

Figure 1-2. Telephone Set TA-312/PT, case closed.

CHAPTER 2
INSTALLATION

2-1. Unpacking
(fig. 2-1)

a. Packaging Data. When packaged for shipment, the TA-312/PT is placed in a cardboard carton. For domestic shipment, six cardboard cartons are placed in a cardboard box. For export shipment, 15 cardboard cartons are packed in a waterproof barrier in a wooden box. The dimensions, volume, and weight are as follows:

Package	Approximate dimensions (in.)			Volume (cu ft)	Weight (lb)
	Length	Height	Width		
Carton	15	7¾	5	.34	9¾
Cardboard box	31	8½	15¾	2.4	62
Wooden box	28½	17	24½	6.86	194

b. Removing Contents.

(1) *Cardboard box.*

(*a*) Cut or tear the sealing tape, and fold back the top flaps of the cardboard box.

(*b*) Remove the cardboard cartons.

(2) *Wooden box.*

(*a*) Cut and fold back the metal straps.

Caution: **Do not attempt to pry off the wooden cover. Prying may damage the equipment in the wooden box.**

(*b*) Remove the nails from the cover with a nailpuller, and remove the cover.

(*c*) Cut or tear open the waterproof barrier.

(*d*) Remove the cardboard cartons.

(3) *Cardboard cartons.*

(*a*) Cut or tear the sealing tape, and fold back the top flaps of the cardboard carton.

(*b*) Open the slide fastener, and remove the corrugated paper.

2-2. Checking

a. Inspect the equipment for damage. If a TA-312/PT has been damaged, fill out and forward DD Form 6 (para 1-3*b*).

b. Check to see that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (appx B). Report all discrepancies in accordance with TM 38-750.

c. If the equipment has been reconditioned, ascertain if it has been modified. If the equipment has been modified, the modification work order (MWO) number will appear on the front

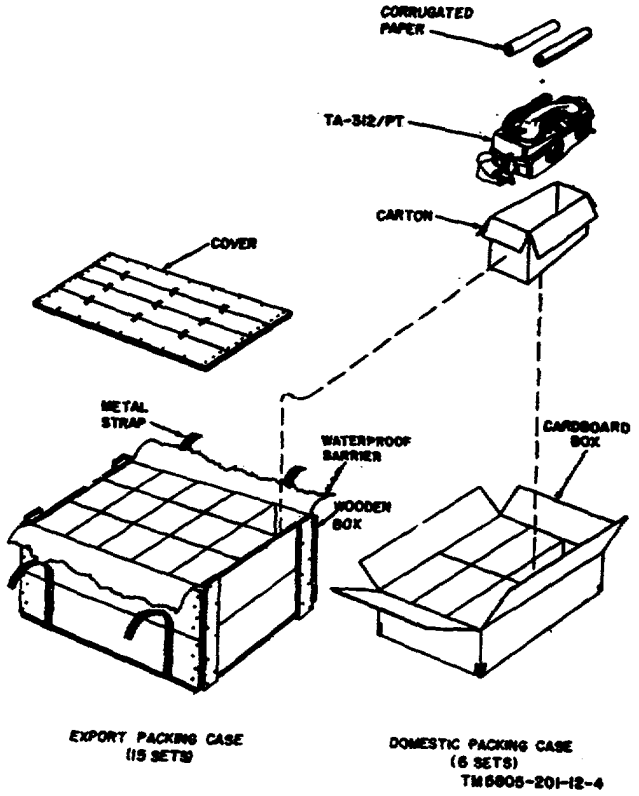


Figure 2-1. Telephone Set TA-312/PT, packaging diagram.

panel near the nomenclature plate. Check to see whether appropriate notations concerning modifications have been written into the manual on the equipment.

Note. Current MWO's applicable to the equipment are listed in DA Pam 310-4.

2-3. Installing

The TA-312/PT may be used as a desk phone, or it may be mounted vertically on a tree, pole, or other support.

a. Use of TA-312/PT as a Desk Set. Unbuckle the carrying case retaining strap (fig. 2-2), and remove the panel and housing assembly from the carrying case. Store the carrying case for later use. Place the panel and housing assembly in a convenient location on the desk.

b. Installation of TA-312/PT on a Tree or Pole.

(1) Unhook the end of the carrying strap on the Buzzer BZ-23/PT end of the carrying case.

(2) Adjust the carrying strap to a length equal to the circumference of the support. For a thin support adjust it to twice the circumference to wrap it around twice.

(3) Place the TA-312/PT against the support with the LINE 1-2 binding posts (fig. 1-1) at the top.

(4) Wrap the carrying strap around the support, and secure the free end to the upper ring on the carrying case.

(5) Wrap a length of field wire around the support and through the lower loop of the carrying case, and tie it securely in place.

c. Setting Selector Switch. Use a screwdriver to set the selector switch to the proper position for the service being used.

d. Connecting the Line.

(1) Strip approximately 1 inch of insulation from the ends of the two wires in the line to be connected. Scrape the stripped ends clear.

(2) Fold back the stripped wires about one-half inch from the end.

(3) Push down one of the LINE 1–2 binding posts. Insert the bare end of one wire into the binding post slot, and release the post. Check to see that the wire is securely clamped. Repeat the procedure with the other wire, in the other post.

e. Connecting External Batteries.

(1) Remove the BA–30's from the battery compartment.

(2) Connect a 3-volt battery source to the BAT binding posts on the panel.

f. Installing Batteries BA-30 (fig. 2-2).

(1) Remove the H-60/PT from the retaining cradle, and open the carrying case retaining strap.

(2) Rotate the battery compartment cover latch clockwise until the cover is released. Lift the cover to expose the battery compartment.

(3) Insert two Batteries BA-30 in the battery compartment, one with the positive terminal up, and the other with the positive terminal down.

(4) Close the cover, and turn the cover latch counterclockwise to lock the cover closed.

(5) Refasten the carrying case retaining strap over the battery compartment, if the TA-312/PT is to be kept in the carrying case.

g. Installing and Removing Deicing Screen (fig. 1-1).

(1) In cold climates, install the deicing screen to prevent the operator's breath from freezing on the transmitter.

(*a*) Place the screen in position over the front of the transmitter.

(*b*) Use your finger or the blade of a screwdriver to press evenly around the rim of the screen and seat it firmly in the slot around the face of the transmitter cap.

Figure 2–5. Telephone Set TA–312/PT, batteries installed.

(2) Remove the deicing screen by inserting the blade of a screwdriver in the slot in the transmitter cap. Pry up the screen with a twisting motion.
(3) When the screen is not in use, store it between the carrying case and the side of the housing assembly opposite the BZ-23/PT.

2-4. Adjusting Buzzer BZ-23/PT Volume

Contact a distant party or switchboard, and ask them to ring on the line. Adjust the LOUD-LOW control to the desired volume. The fully clockwise position of the control is the maximum loud position.

2-5. Connecting Handset-Headset H-144(*)/U

Connect Handset-Headset H-144(*)/U to the TA-312/PT by connecting Connector, Plug U-77/U on the H-144(*)/U cord to Connector, Receptacle U-79/U on the panel of the TA-312/PT. Leave the H-60/PT in the retaining cradle while the H-144(*)/U is connected.

CHAPTER 3
OPERATION

3-1. Controls and Indicators

(fig. 3-1 and 1-2)

The following chart describes the controls and indicators of Telephone Set TA-312/PT and the function of each.

Control or Indicator	Function
Hook switch	Connects H-60/PT to line during operation. Switch is operated when H-60/PT is removed from retaining cradle and is open when H-60/PT is in retaining cradle.
Selector switch	Connects internal circuits of TA-312/PT for particular type of service to be used: *Position* — *Function* CB — Common battery operation. LB — Local battery operation. CBS — Common battery signaling (local battery for voice).
EXT-INT switch	Permits selection of H-144(*)/U in place of H-60/PT:

Control or indicator	Function
	Position — *Function* EXT — Selects H-144(*)/U (H-60/PT inoperative). INT — Selects H-60/PT (H-144(*)/U inoperative).
LOW-LOUD control	Adjusts BZ-23/PT volume.
Handcrank (part of G-42A/PT).	When turned, operates G-42A/PT for signaling in LB operation.
BZ-23/PT	Provides audible indication of incoming call or disconnect.

3-2. Initiating Calls

Caution: **Always perform the appropriate disconnect procedure when the call is terminated. If the proper procedure is not followed, the buzzer may not operate on the next incoming call.**

a. CB and CBS Operation Using H-60/PT.

(1) Operate the INT-EXT switch to INT.

(2) Remove the H-60/PT from its retaining cradle, and wait for the switchboard operator to answer.

(3) For CBS operation, operate the press-to-talk switch (fig. 1-1) to talk and release it when listening.

(4) For CB operation, do not use the press-to-talk switch.

(5) When the call is terminated, replace the H-60/PT in its retaining cradle.

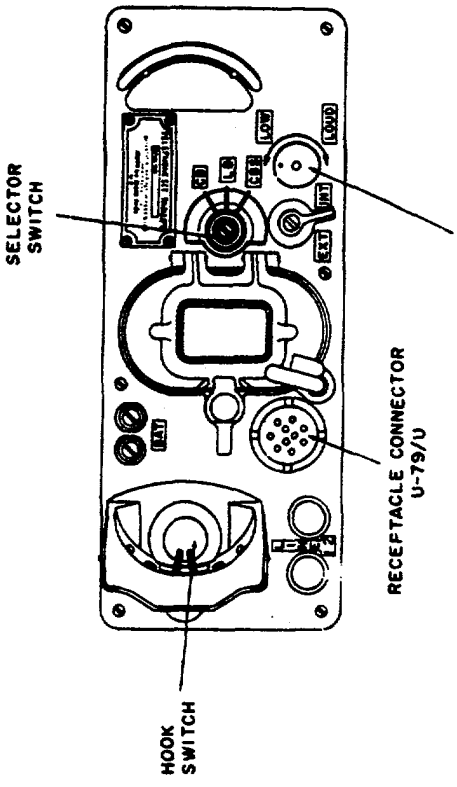


Figure 2-1. Telephone Set TA-312/PT, controls and indicators.

b. CB and CBS Operation Using H-144(*)/U.

(1) Make sure that the H-60/PT is seated firmly in the retaining cradle.
(2) Operate the INT-EXT switch to EXT, and wait for the operator to answer.
(3) For CBS operation, press the press-to-talk switch to talk and release it to listen.
(4) For CB operation, the press-to-talk switch is not used.
(5) When the call is terminated, operate the INT-EXT switch to INT.

c. LB Operation Using H-60/PT.

(1) Operate the INT-EXT switch to INT.
(2) Make sure that the H-60/PT is seated firmly in the retaining cradle.
(3) Turn the handcrank rapidly a few turns.
(4) Remove the H-60/PT from the retaining cradle, and wait for the operator or called party to answer.
(5) Operate the press-to-talk switch to talk, and release it to listen.
(6) When the call is terminated, replace the H-60/PT in the retaining cradle and turn the handcrank rapidly a few turns. This will signal the switchboard that the call has been completed.

d. LB Operation Using H-144(*)/U.

(1) Make sure that the H-60/PT is firmly seated in the retaining cradle.

(2) Operate the INT-EXT switch to EXT, and turn the handcrank rapidly for a few turns.
(3) Wait for the called party or the switchboard to answer.
(4) Press the press-to-talk switch to talk, and release it to listen.
(5) When the call is terminated, release the press-to-talk switch and turn the handcrank rapidly a few turns. This will signal the switchboard that the call has been completed.

3-3. Answering Calls

a. Using H-60/PT.

(1) When the BZ-23/PT sounds, remove the H-60/PT from the retaining cradle.
(2) For LB or CBS operation, press the press-to-talk switch to talk and release it to listen. For CB operation, it is not necessary to operate the press-to-talk switch to talk.
(3) When the call is terminated, replace the H-60/PT in the retaining cradle. After LB operation, turn the handcrank rapidly a few turns to signal the switchboard that the call has been completed.

b. Using H-144(*)/U.

(1) Make sure that the H-60/PT is seated firmly in the retaining cradle.

(2) When the BZ-23/PT sounds, operate the INT-EXT switch to EXT.
(3) For LB or CBS operation, press the press-to-talk switch to answer, release it to listen. For CB operation it is not necessary to operate the press-to-talk switch to answer.
(4) When the call is terminated, release the press-to-talk switch. After CB or CBS operation, operate the INT-EXT switch to INT. After LB operation, turn the handcrank rapidly a few turns to signal the switchboard that the call is completed.

3-4. Operation Under Unusual Conditions

a. Cold Climates. Extreme cold reduces battery voltage, decreases the efficiency of the transmitter and receiver, and makes the H-60/PT and H-144(*)/U cords and other rubber parts stiff and brittle.

(1) Protect the TA-312/PT as much as possible. If the TA-312/PT must be kept outdoors in the extreme cold, install Batteries BA-2030 in place of Batteries BA-30, or keep an extra set of Batteries BA-30 in your pocket to keep them warm. The extra batteries may be used to replace batteries affected by the cold.
(2) Make sure the deicing screen is installed.

If no deicing screen is available, carefully remove ice or moisture from the transmitter and cover it with a dry, clean cloth.

(3) Handle the TA-312/PT carefully to avoid breaking or cracking the rubber parts.

b. Hot, Dry Climates. Hot, dry climates expose the TA-312/PT to damage from dirt, dust, and the effects of strong sunlight.

(1) Protect the TA-312/PT from sand, dust, and strong sunlight. Clean and dust the equipment frequently.

(2) When the TA-312/PT is not in use, close the slide fastener to keep out dust and other dirt.

c. Warm, Damp Climates. Warm, damp climates expose the TA-312/PT to damage from moisture and fungus. Wipe all fungus and moisture from the exterior with a clean, lint-free cloth.

d. Noisy Areas.

(1) Speak directly into the transmitter in a loud, clear voice.

(2) For LB or CBS operation, release the press-to-talk switch when listening. For CB operation, cover the transmitter with one hand while listening.

(3) Shield the transmitter from the noise source with the hand or body while talking.

e. Long Telephone Loops. The LB and CBS circuits provide better transmission than the CB circuit over long distances. When the TA-312/PT is used on a long CB circuit and transmission is noticeably affected, operate the selector switch to the CBS position and install batteries.

f. Emergency Sound Power Operation. If no battery supply is available, it is possible to transmit for approximately 4 miles by using the receiver element as a sound-powered transmitter element.

(1) Signal by turning the handcrank rapidly a few turns.

(2) Speak directly into the receiver element, then listen while the distant party is transmitting.

CHAPTER 4
MAINTENANCE

4-1. Scope of Maintenance

a. General.

(1) Operator preventive maintenance is the systematic care, servicing, and inspection of the equipment to prevent the occurrence of trouble, reduce downtime, and maintain the equipment in serviceable condition. Operator preventive maintenance is performed daily; specific procedures are provided in paragraph 4-2.

(2) Organizational preventive maintenance is performed quarterly; specific procedures are provided in paragraph 4-3.

(3) The preventive maintenance checks and services described in paragraphs 4-2 and 4-3 outline inspections to be made at specific intervals and are designed to help maintain equipment in serviceable condition. They indicate what items should be checked and how they should be checked. Also included are references to test, illustrations, and

other manuals that contain supplementary information.

(4) Organizational repair procedures for replacement of parts authorized at organizational maintenance are provided in paragraph 4–4.

b. Preventive Maintenance Checks and Services Periods. Preventive maintenance checks and services for the TA–312/PT are required daily (para 4–2) and quarterly (para 4–3). These checks and services must be performed during the specified periods. In addition, the daily checks and services must be performed under the following special conditions:

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each week if the equipment is maintained in a standby condition.

Warning: **Prolonged breathing of cleaning compound (FSN 7930–395–9542) fumes is dangerous; make certain that adequate ventilation is provided. Cleaning compound is flammable; do not use near a flame. Avoid contact with the skin; wash off any that spills on your hands.**

(1) Remove dust or dirt with a clean soft cloth.

(2) Remove grease, fungus, and ground-in dirt from the case, cord, H–60/PT housings, connectors, and battery compart-

ment with a clean cloth dampened (not wet) with cleaning compound.

(8) Remove dust or loose dirt from terminals, binding posts, control knobs, and the H-60/PT transmitter and receiver elements with a brush.

4-2. Operator's Daily Preventive Maintenance Checks and Services

Sequence No.	Item to be inspected	Procedure	References
1	Completeness	Check to see that equipment is complete and intact.	Appx B
2	Installation	Check to see that TA-312/PT is properly installed.	None.
3	Cleanliness	Check to see that case, panel, connector contacts, controls, cord, and H-60/PT are clean and free from fungus or corrosion.	Para 4-1*c*.
4	Battery compartment	Inspect for cleanliness and foreign matter. Check condition of batteries.	None.
5	H-60/PT seating	Make sure that H-60/PT seats firmly in retaining cradle and that retaining cradle springs maintain proper tension.	None.
6	Connections	Inspect binding posts to insure that connections are tight. Check cord on H-60/PT for cracks or breaks.	None.

7	Knobs and switches	Check to see that all control knobs and switches operate properly without binding.	None.
8	Operational check	Initiate a call, and check the operation of the TA–312/PT.	Para 3–2.

4–3. Organizational Quarterly Preventive Maintenance Checks and Services

Sequence No.	Item to be inspected	Procedure	References
1	Completeness	Check to see that equipment is complete and has a complete complement of running spare parts.	Appx B.
2	Publications	Check to see that manuals are complete and serviceable and that all changes publications are available.	Appx A, DA Pam 310–4.
3	Modification work orders	Make sure that all applicable MWO's have been made or scheduled and that MWO numbers of completed MWO's are marked on equipment.	DA Pam 310–4.

Sequence No.	Item to be inspected	Procedure	References
4	Gaskets	Check gaskets and moisture-blocking diaphrams on receiver and transmitter for cuts, tears, or breaks.	None.
5	Mounting	Check to see that mounting hardware is complete and in serviceable condition.	None.
6	Connections	Check to see that binding posts have enough tension to hold wires. Check wires for fraying, breaks, or cracked insulation.	None.

4-4. Organizational Repair

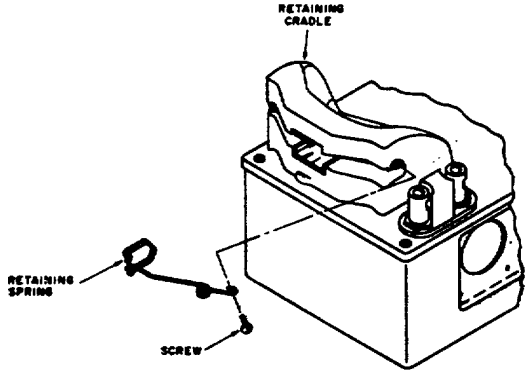
Organizational repair of the TA-312/PT is limited to the adjustment and replacement of the handset retaining springs in the retaining cradle. If either spring is broken, or if the spring tension is too low to hold the H-60/PT in the cradle, adjust the spring or replace it with a new one.

Note. The left- and right-hand springs are not identical or interchangeable. Be sure to replace a defective spring with the proper replacement part.

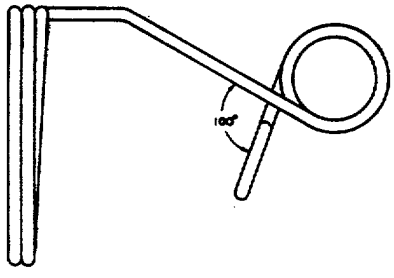
a. Removing Retaining Springs (A, fig. 4-1). Remove the screws securing the springs in the retaining cradle. Lift the springs out of the slot.

b. Adjusting Retaining Springs (B, fig. 4-1). Adjust the replacement spring to approximately a 100 degree angle between the two arms of the spring. Use a pair of long-nosed pliers or adjust the angle by hand.

c. Replacing Retaining Springs (A, fig. 4-1). Replace the defective spring with the proper replacement (appx A), insert the screw, and tighten it in place. Seat the H-60/PT in the cradle, and check to see that the retaining spring maintains the proper pressure to hold the H-60/PT in place.



A. REMOVAL.



B. ADJUSTMENT ANGLE.

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Figure 4-1. Removal and adjustment of handset retaining spring.

EXTRACT TM 11-5805-201-35

CHAPTER 2

FUNCTIONING

2-1. General (fig. 5-1)

a. Telephone Set TA-312/PT may be used with any manual, two-wire field telephone system using local battery (LB), common battery (CB), or common battery signaling (CBS). The majority of the circuits in the TA-312/PT are contained in Impedance Matching Network CU-350/PT. In addition to the CU-350/PT, the TA-312/PT contains Handset H-60/PT, Generator, Hand Ringing G-42A/PT, Buzzer BZ-23/PT, three switches, and Connector, Receptacle U-79/U for connecting external Handset-Headset H-144(*)/U. Local battery power is supplied by two Batteries BA-30, located in the battery compartment, or by an external 3-volt power source connected through the BAT. terminals. Common battery power, signaling, and voice signals are connected to the line through terminals LINE 1-2.

Note. Handset-Headsst H-144(*)/U designates Handset-Headset H-144/U, H-144A/U, H-144B/U, or H-144C/U.

b. The G-42A/PT is a handcrank signaling device which produces a 90-volt, 20-cycle-per-second (cps) ringing signal when it is cranked at normal speed. Turning the crank operates an internal switch, connecting the G-42A/PT to the LINE 1-2 terminals, and disconnecting the BZ-23/PT. The G-42A/PT is operated with the H-60/PT in the retaining cradle, which holds the contacts of hook switch S2 open. When the G-42A/PT is not being cranked, the internal switch remains open, disconnecting the G-42A/PT and connecting the BZ-23/PT to the LINE 1-2 posts.

c. Selector switch S1 is a screwdriver-adjusted switch having three positions: CB (common battery), LB (local battery), and CBS (common battery signaling). Selector switch S1 is initially operated to the proper position during installation, according to the type of system in use. Hook switch S2 is located in the retaining cradle. When the H-60/PT is in the retaining cradle, all of the contacts are held open. When the H-60/PT is lifted from the retaining cradle, all of the contacts close. INT-EXT switch S3 selects either the H-60/PT (INT position) or the H-144(*)/U (EXT position) for use in the circuit.

2-2. Signaling

a. Incoming Signals. The incoming 20-cps ringing signals are received through the LINE 1-2 terminals and applied to Buzzer BZ-23/PT. Capacitor P of the CU-350/PT, in series with the BZ-23/PT, acts as a direct current (dc) block, preventing draining of the batteries through the BZ-23/PT.

b. LB Signaling. In an LB connection, the LINE 1-2 terminals are connected through a two-wire line to a local battery switchboard, another TA-312/PT, or a similar telephone set. Selector switch S1 is in the LB position, and the H-60/PT is in the retaining cradle. When the G-42A/PT is cranked, its internal switch closes and it generates a 20-cps ringing signal which is connected to the line through the LINE 1-2 terminals.

c. Signaling CB Switchboard. When the TA-312/PT is connected to a common battery switchboard, dc signaling is used. Lifting the H-60/PT from the retaining cradle operates hook switch S2 and completes the dc path for signaling the switchboard.

d. Signaling CBS Switchboard. In CBS operation, dc signaling power is provided by the switchboard, and the local batteries are used for transmission. As in CB operation, lifting the H-60/PT from the retaining cradle closes

the contacts of hook switch S2 and completes the dc signaling path.

e. Signaling Using H-144(*)/U. When the H-144(*)/U is used, the H-60/PT is left in the retaining cradle, holding the contacts of hook switch S2 open; S2 disconnects the H-60/PT from the circuit. INT-EXT switch S3 is operated to EXT. The dc signaling path is then provided through the contacts of S3, the jumper across pins K and J of Connector, Plug U-77/U, and contacts 3 and 4 of the H-144(*)/U press-to-talk switch.

f. Controlling Remote Equipment. The TA-312/PT may be used to control the operation of a remote equipment, such as a radio set. Selector switch S1 is operated to LB, and dc may then be switched on or off on the line by operating the press-to-talk switch in the H-60/PT or the H-144(*)/U.

2-3. Transmission Using Handset H-60/PT

a. Transmitting, LB and CBS Operation.

(1) *Battery supply.* Current is supplied to the transmitter from the internal battery through inductor E of the CU-350/PT, switch S1 contacts 9 and 10, the transmitter and press-to-talk contacts of the H-60/PT, and contacts 5 and 6 of hook switch S2. Inductor E in the CU-350/PT has a high impedance to audiofrequencies and prevents the voice signals from being shunted through the battery.

(2) *Voice current path.* Voice current is produced in the H-60/PT transmitter and is applied to the line through coil A, resistor N, and capacitor M of the CU-350/PT. Part of the voice current is shunted through coil H of the CU-350/PT to reduce the sidetone level in the receiver.

b. Transmitting, CB Operation.

(1) *Battery supply.* For CB operation, battery power is supplied from the central office. With selector switch S1 at CB, contact 10 is open and the local battery is disconnected. Dc from the central office is connected through LINE terminals 1 and 2, resistor L, and coil A of the CU-350/PT, and the contacts of hook switch S2 to the transmitter of the H-60/PT. A stabilizing circuit, consisting of resistor G, varistor CR1, and capacitor K, is bridged across the inputs from the LINE terminals. This circuit compensates for differences in dc voltage supplied to the TA-312/PT from the central office, depending on the length of line involved. If the central office is close to the TA-312/PT, the line voltage is high and varistor CR1 resistance is low to shunt the power from the transmitter and receiver circuits. If the distance is greater, the line voltage will be lower, the resistance of varistor CR1 will be higher, and more of the line voltage will be available for the transmitter and receiver circuits. The action of the varistor maintains a relatively constant dc level for the TA-312/PT circuits. Capacitor K is a high-frequency shunt across varistor CR1.

(2) *Voice current path.* Voice current produced in the transmitter of the H-60/PT is applied to the line through coil A and resistor L of the CU-350/PT. As in LB operation, part of the transmitter voice current is shunted through coil H of the CU-350/PT to reduce the sidetone level.

c. Receiving. The incoming voice signals received at LINE terminals 1 and 2 are applied across coils A and H of the CU-350/PT. These coils act as the primary of a transformer, with coil C as the secondary winding. The secondary circuit remains the same in all modes of operation, with resistor B of the CU-350/PT in series with the receiver of the H-60/PT. In LB and CBS operation, capacitor M and resistor N in the CU-350/PT are connected in series with the primary circuit. In CB operation, they are bypassed through the contacts of selector switch S1.

d. Antisidetone Circuit. Windings A, C, and H of the CU-350/PT form an antisidetone circuit. Transmitter voice current flows through

windings A and H in opposite directions, inducing opposing currents in winding C, and reducing the level of the receiver sidetone. Voice current received through LINE terminals 1 and 2 flows through winding A and divides, part of it flowing through the transmitter and the rest glowing through winding H. The currents in windings A and H are in the same direction and induce a greater voltage in winding C. The balancing network, composed of capacitors D and F, resistor B, and varistor CR2, matches the impedance characteristics of the line and maintains sidetone balance over a wide range of voice frequencies and battery voltages.

2-4. Transmission Using Handset-Headset H-144(*)/U

Handset-Headset H-144(*)/U is connected in parallel with Handset H-60/PT through the terminals of Receptacle-Connector U-79/U. The signaling, transmitting, and receiving circuits remain the same as described in paragraph 2-3. INT-EXT switch S3 is set to EXT. The H-60/PT remains in the retaining cradle during operation with the H-144(*)/U.

CHAPTER 3

MAINTENANCE

Section I. DIRECT SUPPORT MAINTENANCE

3-1. Scope of Direct Support Maintenance

Direct support maintenance of the TA-312/PT includes repair or replacement of all exterior and interior components and of Handset H-60/PT. Direct support troubleshooting procedures are presented in paragraphs 3-3 and 3-4. Resistance and continuity measurements used to supplement these procedures are presented in paragraph 3-5. Procedures for removing and replacing parts are presented in paragraphs 3-6 through 3-23. Cleaning and lubrication procedures are presented in paragraphs 3-24 and 2-25.

3-2. Test Equipment, Tools, and Materials

All test equipment and tools required for direct support maintenance of the TA-312/PT are listed in the maintenance allocation chart in TM 11-5805-210-12. Special materials required are listed in *a* through *e* below.

a. Cleaning Compound, FSN 7930-895-9542.

b. Gasket Compound, Sealing 6G240.4.

c. Grease, Aircraft and Instrument (GL) (FSN 9150-261-8297).

d. Wax, Paraffin (FSN 9160-285-2044).

e. Talcum, Technical Powder, FSN 6810-270-9989.

3-3. Troubleshooting Procedures

Troubleshooting the TA-312/PT is performed through the operational checks (*a* below), mechanical inspections (*b* below), the symptoms listed in the troubleshooting chart (para 3-4), and resistance and continuity measurements (para 3-5).

a. Operational Checks.

(1) *LB transmission and signaling, Handset H-60/PT.* Connect the TA-312/PT under test to another TA-312/PT, Telephone Set TA-43/PT, or similar equipment for local battery operation. Perform the preliminary operational checks in TM 11-5805-201-12.

(2) *LB transmission and signaling, Handset-Headset H-144(*)/U.*

(*a*) Connect the H-144(*)/U to Connector, Receptacle U-79/U. Operate the INT-EXT switch to EXT and repeat the procedure in (1) above, using the H-144(*)/U. Leave the H-60/PT in the retaining cradle.

(*b*) Operate the INT-EXT switch to INT. Transmission and reception should not be possible.

(3) *CB transmission and signaling.*

(*a*) Connect the TA-312/PT to a common battery switchboard. Operate the INT-EXT switch to INT and the circuit selector switch to CB.

(*b*) Lift the H-60/PT from the retaining cradle; this should signal the switchboard.

(*c*) Talk to the switchboard operator; transmission and reception should be loud and clear.

(4) *CBS transmission and signaling.* Operate the selector switch to CBS, and repeat the procedure in (3) above. Check to see that batteries are installed.

(5) *Alternate check of CBS operation.* If a common battery switchboard is not available, check CBS operation as follows:

(*a*) Check to see that batteries are installed in the TA-312/PT operate the selector switch to CBS, and connect the LINE 1-2 binding posts to another local battery telephone.

(*b*) Operate the press-to-talk switch on the H-60/PT, and talk to someone at the other telephone; transmission and reception should be loud and clear.

(*c*) Remove the H-60/PT from the retaining cradle, and operate the G-42A/PT. Considerable force should be required to operate the handcrank. This tests the continuity of hold coil J in the CU-350/PT.

b. Mechanical Inspection.

(1) *Panel and housing assembly.* Check the panel gasket and buzzer gasket (fig. 3-1) and gaskets on the panel screws for aging and cracking. The panel and buzzer gaskets should be cemented firmly in place. Remove grease or grime from the three waterproof air valves on the generator spacer.

(2) *Generator, Hand Ringing G-42A/PT.* Check the G-42A/PT by rotating the handcrank rapidly for two or three turns and then stopping it. The generator switch should open about 1 second later, making a dull sound.

(3) *Handset H-60/PT* (fig. 3-3).

(*a*) Check the deicing screen, the rubber cover on the press-to-talk switch, and the gasket on the hook switch to be sure they are not dried out, cracked, or worn.

(*b*) Check the internal wiring for damaged insulation, and check all connections.

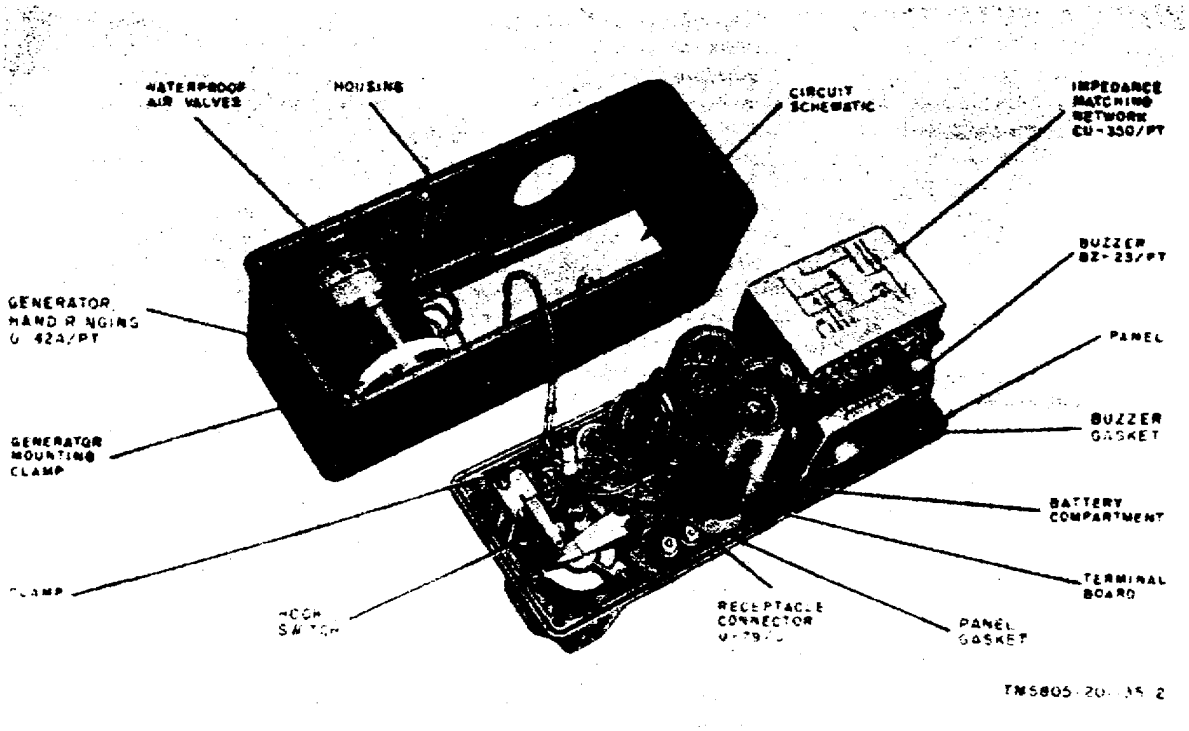

Figure 3-1. TA-312/PT with panel assembly removed from housing.

Section II. TROUBLESHOOTING

3-4. Troubleshooting Chart

Item No.	Symptom	Probable trouble	Correction
1	No transmission or reception.	Poor line connections	Clean incoming line wire.
		Defective *LINE 1-2 binding* posts.	Replace *LINE 1-2 binding* posts.
		Defective H-60/PT cord	Replace cord.
		Defective hook switch	Adjust or replace hook switch.
		Loose connections on terminal board.	Tighten loose connection.
		Loose connections or broken wiring.	Resolder loose connection; repair or replace broken wiring.
		Defective switch contacts in G-42A/PT.	Replace G-42A/PT.
		Defective CU-350/PT	Replace CU-350/PT.
2	Cannot transmit or receive in LB or CBS operation.	Defective resistor N or capacitor P in CU-350/PT.	Replace CU-350/PT.
		Shorted hold coil J	Replace CU-350/PT.
3	Cannot transmit or receive in CB operation.	Defective selector switch contacts 1 and 2.	Adjust contacts or replace selector switch.
4	No transmission	Defective transmitter	Replace transmitter.
		Defective H-60/PT cord	Replace cord.
		Defective capacitor in H-60/PT.	Replace capacitor.
		Defective hook switch contacts 1 and 2.	Adjust or replace hook switch.
		Loose connection on terminal board.	Tighten all connections.
		Defective CU-350/PT	Replace CU-350/PT.
5	Cannot transmit in LB or CBS operation.	Defective Batteries BA-30	Replace Batteries BA-30.
		Defective hook switch contacts 5 and 6.	Adjust contacts or replace switch.
		Loose connections or broken wiring.	Resolder loose connections; repair or replace broken wiring.
		Defective press-to-talk switch	Replace press-to-talk switch.
		Defective selector switch contacts 9 and 10.	Replace selector switch.
		Defective CU-350/PT	Replace CU-350/PT.
6	Cannot transmit in CB operation.	Open resistor L in CU-350/PT.	Replace CU-350/PT.
		Loose connections or broken wiring.	Tighten connections; repair or replace broken wiring.
7	Cannot receive	Defective receiver	Replace receiver.
		Shorted varistor CR3	Replace varistor.
		Defective cord on H-60/PT	Replace cord.
		Loose connections or broken wiring.	Tighten connections; repair or replace broken wiring.
		Defective hook switch contacts 7 and 8.	Adjust contacts or replace switch.
		Defective CU-350PT (open or shorted winding C; open resistor B).	Replace CU-350/PT.
8	Weak or distorted transmission and reception in LB ,CB, and CBS.	Defective antisidetone and balancing circuit in CU-350/PT.	Replace CU-350/PT.

Item No.	Symptom	Probable trouble	Correction
9	Weak or distorted transmission and reception in CB operation.	Shorted resistor G or varistor CR1 in CU-350/PT.	Replace CU-350/PT.
10	Weak or distorted reception.	Defective receiver	Replace receiver.
11	Increased sidetone	Defective winding H in CU-350/PT.	Replace CU-350/PT.
12	Loud clicks in receiver.	Open or defective varistor CR3.	Replace varistor.
13	Weak or distorted transmission.	Defective transmitter element	Replace transmitter element.
14	Weak transmission in LB and CBS.	Weak Batteries BA-30	Replace Batteries BA-30.
15	Cannot signal in LB operation.	Loose connection at G-42A/PT.	Resolder connections on G-42A/PT.
		Defective switch in G-42A/PT.	Replace G-42A/PT.
		Defective G-42A/PT	Replace G-42A/PT.
		Broken wiring	Repair or replace wiring.
16	Cannot signal in CBS operation.	Open hold coil J in CU-350/PT.	Replace CU-350/PT.
		Defective selector switch contacts 9 and 11.	Adjust or replace switch.
17	Buzzer does not sound on incoming signals.	Loose connections at terminal board	Tighten connections.
		Defective Buzzer BZ-23/PT	Replace BZ-23/PT.
		Defective or broken wiring	Repair or replace broken wiring.
		Defective G-42A/PT contacts	Replace G-42A/PT.
		Defective capacitor P in CU-350/PT.	Replace CU-350/PT.
18	Cannot operate remote equipment in LB operation.	Open hold coil J in CU-350/PT.	Replace CU-350/PT.
		Defective selector switch contacts 8 and 9.	Burnish contacts, or replace switch.
		Loose connections or defective wiring.	Tighten connections; repair or replace defective wiring.
		Defective press-to-talk switch	Replace press-to-talk switch.
		Defective H-60/PT cord	Replace cord.
19	Cannot receive or transmit with 144(*)/U.	Defective INT-EXT switch S3.	Replace switch.
		Loose connection or defective wiring.	Tighten connections; repair or replace defective wiring.
		Defective U-79/U	Replace U-79/U.

3-5. Resistance Measurements (fig. 3-2)

The following chart lists resistance measurements which may be made in the TA-312/PT during troubleshooting. Not all of the circuits in the CU-350/PT can be measured with the Multimeter TS-352B/U since they include capacitors or varistors in series. The resistance of a varistor cannot be measured accurately since it varies with the voltage applied to it.

Component	Terminal or test point	Ohms	Remarks
Resistor B	CU-350/PT term. 7-10	100 ±10	Measure with hook switch contacts open [a].
Resistor L	CU-350/PT term. 6-11	22 ±2	Selector switch at CB.
Winding A	CU-350/PT term. 8-10	27 ±3	
Winding C	CU-350/PT term. 9-10	12 ±1	Hook switch contacts open.
Coil J	CU-350/PT term. 4-5	50 ±5	Selector switch at CB.
Coil E	CU-350/PT term. 2-3	8.5 ±9	Selector switch at CB.
G-42A/PT	LINE 1-2 posts	750 ±75	Generator switch contacts open [b].
BZ-23/PT	Across terminals	3,240 to 4,100.	Hook switch contacts open.
Receiver	Across terminals	35 ±4	CR3 disconnected and hook switch contacts open.

a The H-60/PT is in the cradle or the hook switch is held open manually.
b Turn the G-42A/PT handcrank far enough to close the switch contacts without actually operating the G-42A/PT.

3-6. Replacing Handset H-60/PT Components

(fig. 3-3)

a. Transmitter Element.

(1) *Removal.* Unscrew and remove the transmitter cap (2) and the retaining ring (3). Remove the deicing screen (1), and lift out the transmitter (4 through 8) as a unit. Loosen the screws (4), and disconnect the leads from the bottom of the contact assembly (8).

(2) *Disassembly.* Remove the screws (4) and capacitor (5) from the contact assembly. Separate the gasket (6) from the transmitter element (7) and contact assembly (8).

(3) *Replacement and reassembly.*

(*a*) Reassemble the transmitter as indicated in figure 3-3; the reassembly sequence is the reverse of the disassembly procedure. Clean the contact springs on the contact assembly, and check to see that they mate with the contacts on the transmitter element. Seat the gasket (6) evenly around the transmitter element and contact assembly.

(*b*) Reconnect the leads to the contact assembly (8).

(*c*) Replace the transmitter element in the handle.

(*d*) Replace the retaining ring (3) on top of the gasket (6), and replace the transmitter cap (2).

b. Receiver Element.

(1) *Removal.*

(*a*) Unscrew and remove the receiver cap (9).

(*b*) Hold the handset handle (23) cap side down, and tap the handset to remove the receiver element (10) and receiver gasket (11). The receiver gasket is cemented to the receiver element and must not be removed unless it is damaged.

(*c*) Disconnect the receiver leads by loosening the two screws (12) on the rear of the receiver element (10).

(2) *Replacement.*

(*a*) Check to see that the receiver gasket (11) is cemented securely in place.

(*b*) Reconnect the receiver leads.

(*c*) Replace the receiver element (10) in the handset handle (23).

(*d*) Replace the receiver cap (9).

c. Press-To-Talk Switch.

(1) *Removal.*

(*a*) Remove the two screws (13) and plate (14).

(*b*) Remove the press-to-talk switch (16) and rubber cover (15). Disconnect the three leads. Disconnect the fourth lead from the screw terminal on the contact assembly (8).

(*c*) Remove the rubber cover (15) from the press-to-talk switch assembly (16).

(2) *Replacement.* Apply a thin coating of talcum (FSN 6810-270-9989) to the interior of the rubber cover. Replace the press-to-talk switch as indicated in figure 3-3. Tighten the two screws (13) alternately to insure an even compression of the flange on the rubber cover.

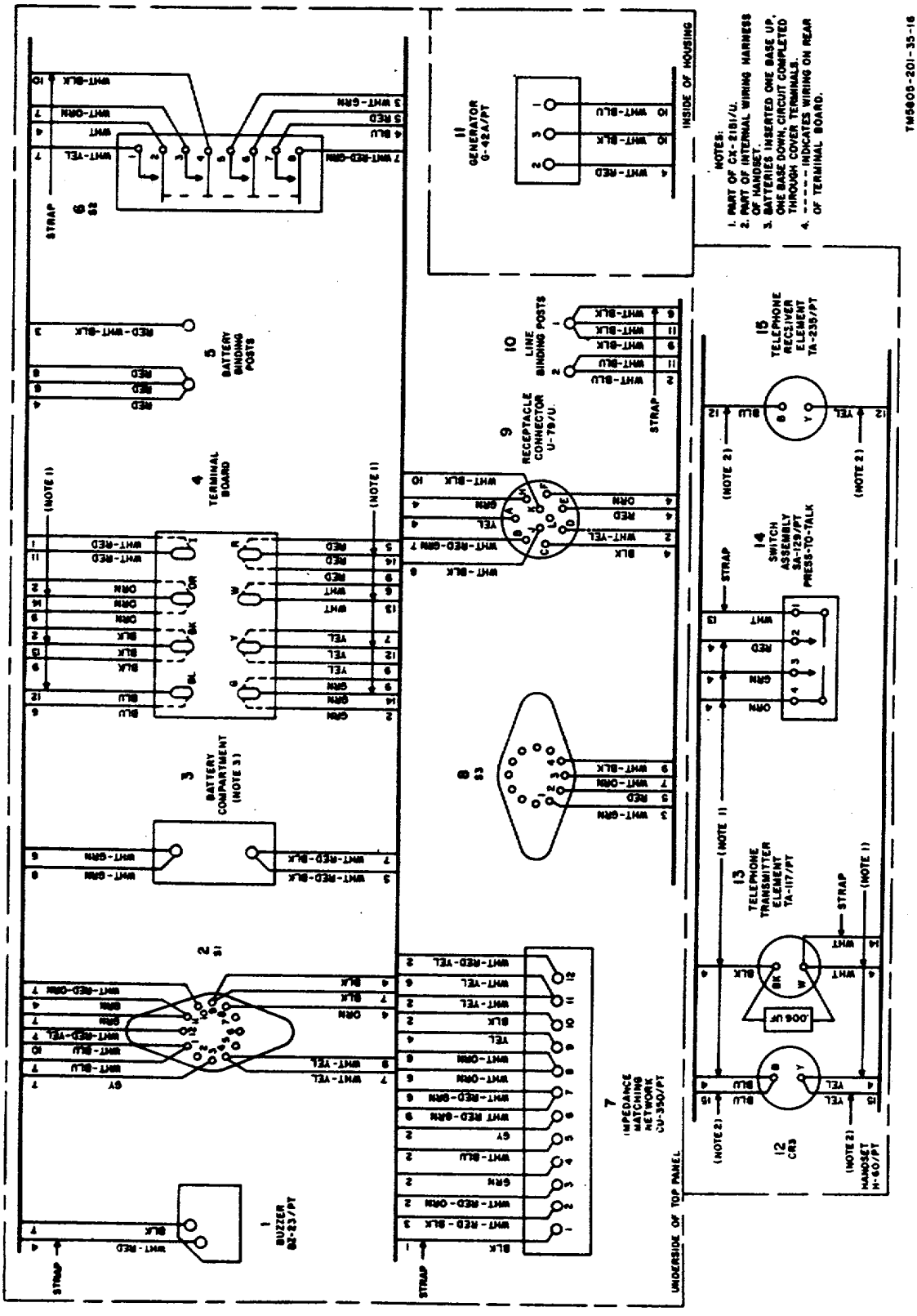

Figure 3-2. Telephone Set TA-312/PT, wiring diagram.